WHAT IS CLAIMED IS:

1. A tube guide for a ball screw comprising a screw shaft including a spiral-shaped ball rolling groove formed in an outer peripheral surface thereof; a nut including a spiral-shaped ball rolling groove formed in an inner peripheral surface thereof; a plurality of balls disposed in a ball rolling passage formed by the two ball rolling grooves; and, a ball circulation tube forming a ball circulation passage and including a ball scooping portion in an end portion thereof, the balls being scooped up at the ball scooping portion so as to circulate along the outer surface of the nut,

wherein the tube guide is used for mounting the ball circulation tube onto the nut, has an outer shape matched to the inner shape of a tube guide insertion hole formed in the nut so as to correspond to the insertion position of the ball scooping portion, and includes a scooping portion insertion hole consisting of a penetration hole formed so as to have an inner shape matched to the outer shape of the ball scooping portion, and

wherein the tube guide is interposed between the ball scooping portion and the tube guide insertion hole.

2. A tube guide for a ball screw as set forth in claim 1, wherein the inner shape of the tube guide insertion hole

is formed a cylindrical shape.

3. A tube guide for a ball screw as set forth in claim 2, wherein the axial line of the cylindrical shape is set perpendicular to the axial line of the nut.

4. A tube guide for a ball screw as set forth in Claim 1, wherein the scooping portion insertion hole has a ball circulation passage scooping angle set so as to correspond to the lead angle of the ball screw.

5. A tube guide for a ball screw as set forth in Claim 2, wherein the scooping portion insertion hole has a ball circulation passage scooping angle set so as to correspond to the lead angle of the ball screw.

6. A tube guide for a ball screw as set forth in Claim 3, wherein the scooping portion insertion hole has a ball circulation passage scooping angle set so as to correspond to the lead angle of the ball screw.

7. A tube guide for a ball screw as set forth in Claim 1, wherein the tube guide is made of elastic material.

8. A tube guide for a ball screw as set forth in Claim

2, wherein the tube guide is made of elastic material.

9. A tube guide for a ball screw as set forth in Claim 3, wherein the tube guide is made of elastic material.

10. A tube guide for a ball screw as set forth in Claim 6, wherein the tube guide is made of elastic material.

11. A ball screw comprising:

a screw shaft including a spiral-shaped ball rolling groove formed in an outer peripheral surface thereof;

a nut including a spiral-shaped ball rolling groove formed in an inner peripheral surface thereof;

a plurality of balls disposed in a ball rolling passage formed by the two ball rolling grooves; and,

a ball circulation tube forming a ball circulation passage and including a ball scooping portion in an end portion thereof, the balls being scooped up at the ball scooping portion so as to circulate along the outer surface of the nut,

wherein the nut includes a tube guide insertion hole corresponded to the insertion position of the ball scooping portion, and the ball circulation tube is mounted on the nut through a tube guide as set forth in Claim 1 between the ball scooping portion and the tube guide insertion hole.

12. A ball screw comprising:

a screw shaft including a spiral-shaped ball rolling groove formed in an outer peripheral surface thereof;

a nut including a spiral-shaped ball rolling groove formed in an inner peripheral surface thereof;

a plurality of balls disposed in a ball rolling passage formed by the two ball rolling grooves; and,

a ball circulation tube forming a ball circulation passage and including a ball scooping portion in an end portion thereof, the balls being scooped up at the ball scooping portion so as to circulate along the outer surface of the nut,

wherein the nut includes a tube guide insertion hole corresponded to the insertion position of the ball scooping portion, and the ball circulation tube is mounted on the nut through a tube guide as set forth in Claim 2 between the ball scooping portion and the tube guide insertion hole.

13. A ball screw comprising:

a screw shaft including a spiral-shaped ball rolling groove formed in an outer peripheral surface thereof;

a nut including a spiral-shaped ball rolling groove formed in an inner peripheral surface thereof;

a plurality of balls disposed in a ball rolling passage formed by the two ball rolling grooves; and,

a ball circulation tube forming a ball circulation passage

and including a ball scooping portion in an end portion thereof, the balls being scooped up at the ball scooping portion so as to circulate along the outer surface of the nut,

wherein the nut includes a tube guide insertion hole corresponded to the insertion position of the ball scooping portion, and the ball circulation tube is mounted on the nut through a tube guide as set forth in Claim 3 between the ball scooping portion and the tube guide insertion hole.

14. A ball screw comprising:

a screw shaft including a spiral-shaped ball rolling groove formed in an outer peripheral surface thereof;

a nut including a spiral-shaped ball rolling groove formed in an inner peripheral surface thereof;

a plurality of balls disposed in a ball rolling passage formed by the two ball rolling grooves; and,

a ball circulation tube forming a ball circulation passage and including a ball scooping portion in an end portion thereof, the balls being scooped up at the ball scooping portion so as to circulate along the outer surface of the nut,

wherein the nut includes a tube guide insertion hole corresponded to the insertion position of the ball scooping portion, and the ball circulation tube is mounted on the nut through a tube guide as set forth in Claim 6 between the ball scooping portion and the tube guide insertion hole.

15. A ball screw comprising:

a screw shaft including a spiral-shaped ball rolling groove formed in an outer peripheral surface thereof;

a nut including a spiral-shaped ball rolling groove formed in an inner peripheral surface thereof;

a plurality of balls disposed in a ball rolling passage formed by the two ball rolling grooves; and,

a ball circulation tube forming a ball circulation passage and including a ball scooping portion in an end portion thereof, the balls being scooped up at the ball scooping portion so as to circulate along the outer surface of the nut,

wherein the nut includes a tube guide insertion hole corresponded to the insertion position of the ball scooping portion, and the ball circulation tube is mounted on the nut through a tube guide as set forth in Claim 10 between the ball scooping portion and the tube guide insertion hole.

16. A method for manufacturing a ball screw comprising: a screw shaft including a spiral-shaped ball rolling groove formed in an outer peripheral surface thereof; a nut including a spiral-shaped ball rolling groove formed in an inner peripheral surface thereof; a plurality of balls disposed in a ball rolling passage formed by the two ball rolling grooves; and, a ball circulation tube forming a ball circulation passage and

including a ball scooping portion in an end portion thereof, the balls being scooped up at the ball scooping portion so as to circulate along the outer surface of the nut, comprising steps of:

forming a tube guide insertion hole on the nut at a position corresponding to the insertion position of the ball scooping portion;

mounting the tube guide as set forth in Claim 1 on the two end portions of the ball circulation tube;

inserting the two end portions of the ball circulation tube with the tube guide into the tube guide insertion holes; and,

fixing the ball circulation tube to the nut.

17. A method for manufacturing a ball screw comprising: a screw shaft including a spiral-shaped ball rolling groove formed in an outer peripheral surface thereof; a nut including a spiral-shaped ball rolling groove formed in an inner peripheral surface thereof; a plurality of balls disposed in a ball rolling passage formed by the two ball rolling grooves; and, a ball circulation tube forming a ball circulation passage and including a ball scooping portion in an end portion thereof, the balls being scooped up at the ball scooping portion so as to circulate along the outer surface of the nut, comprising steps of:

forming a tube guide insertion hole on the nut at a position corresponding to the insertion position of the ball scooping portion;

mounting the tube guide as set forth in Claim 2 on the two end portions of the ball circulation tube;

inserting the two end portions of the ball circulation tube with the tube guide into the tube guide insertion holes; and,

fixing the ball circulation tube to the nut.

18. A method for manufacturing a ball screw comprising: a screw shaft including a spiral-shaped ball rolling groove formed in an outer peripheral surface thereof; a nut including a spiral-shaped ball rolling groove formed in an inner peripheral surface thereof; a plurality of balls disposed in a ball rolling passage formed by the two ball rolling grooves; and, a ball circulation tube forming a ball circulation passage and including a ball scooping portion in an end portion thereof, the balls being scooped up at the ball scooping portion so as to circulate along the outer surface of the nut, comprising steps of:

forming a tube guide insertion hole on the nut at a position corresponding to the insertion position of the ball scooping portion;

mounting the tube guide as set forth in Claim 3 on the

two end portions of the ball circulation tube;

inserting the two end portions of the ball circulation tube with the tube guide into the tube guide insertion holes; and,

fixing the ball circulation tube to the nut.

19. A method for manufacturing a ball screw comprising: a screw shaft including a spiral-shaped ball rolling groove formed in an outer peripheral surface thereof; a nut including a spiral-shaped ball rolling groove formed in an inner peripheral surface thereof; a plurality of balls disposed in a ball rolling passage formed by the two ball rolling grooves; and, a ball circulation tube forming a ball circulation passage and including a ball scooping portion in an end portion thereof, the balls being scooped up at the ball scooping portion so as to circulate along the outer surface of the nut, comprising steps of:

forming a tube guide insertion hole on the nut at a position corresponding to the insertion position of the ball scooping portion;

mounting the tube guide as set forth in Claim 6 on the two end portions of the ball circulation tube;

inserting the two end portions of the ball circulation tube with the tube guide into the tube guide insertion holes; and,

fixing the ball circulation tube to the nut.

20. A method for manufacturing a ball screw comprising: a screw shaft including a spiral-shaped ball rolling groove formed in an outer peripheral surface thereof; a nut including a spiral-shaped ball rolling groove formed in an inner peripheral surface thereof; a plurality of balls disposed in a ball rolling passage formed by the two ball rolling grooves; and, a ball circulation tube forming a ball circulation passage and including a ball scooping portion in an end portion thereof, the balls being scooped up at the ball scooping portion so as to circulate along the outer surface of the nut, comprising steps of:

forming a tube guide insertion hole on the nut at a position corresponding to the insertion position of the ball scooping portion;

mounting the tube guide as set forth in Claim 10 on the two end portions of the ball circulation tube;

inserting the two end portions of the ball circulation tube with the tube guide into the tube guide insertion holes; and,

fixing the ball circulation tube to the nut.

21. A method for manufacturing a ball screw comprising: a screw shaft including a spiral-shaped ball rolling groove

formed in an outer peripheral surface thereof; a nut including a spiral-shaped ball rolling groove formed in an inner peripheral surface thereof; a plurality of balls disposed in a ball rolling passage formed by the two ball rolling grooves; and, a ball circulation tube forming a ball circulation passage and including a ball scooping portion in an end portion thereof, the balls being scooped up at the ball scooping portion so as to circulate along the outer surface of the nut, comprising steps of:

forming a tube guide insertion hole on the nut at a position corresponding to the insertion position of the ball scooping portion;

mounting the tube guide as set forth in Claim 15 on the two end portions of the ball circulation tube;

inserting the two end portions of the ball circulation tube with the tube guide into the tube guide insertion holes; and,

fixing the ball circulation tube to the nut.

22. A method for manufacturing a ball screw as set forth in Claim 16, wherein, in a state where the two end portions of the ball circulation tube are inserted into a mold for molding a tube guide, material for the tube guide is poured into the tube guide molding mold and is hardened therein, whereby the step of manufacturing the tube guide and the step of mounting

the tube guide onto the two end portions of the ball circulation tube is executed at the same time.

23. A method for manufacturing a ball screw as set forth in Claim 17, wherein, in a state where the two end portions of the ball circulation tube are inserted into a mold for molding a tube guide, material for the tube guide is poured into the tube guide molding mold and is hardened therein, whereby the step of manufacturing the tube guide and the step of mounting the tube guide onto the two end portions of the ball circulation tube is executed at the same time.

24. A method for manufacturing a ball screw as set forth in Claim 18, wherein, in a state where the two end portions of the ball circulation tube are inserted into a mold for molding a tube guide, material for the tube guide is poured into the tube guide molding mold and is hardened therein, whereby the step of manufacturing the tube guide and the step of mounting the tube guide onto the two end portions of the ball circulation tube is executed at the same time.

25. A method for manufacturing a ball screw as set forth in Claim 19 wherein, in a state where the two end portions of the ball circulation tube are inserted into a mold for molding a tube guide, material for the tube guide is poured into the

tube guide molding mold and is hardened therein, whereby the step of manufacturing the tube guide and the step of mounting the tube guide onto the two end portions of the ball circulation tube is executed at the same time.

26. A method for manufacturing a ball screw as set forth in Claim 20, wherein, in a state where the two end portions of the ball circulation tube are inserted into a mold for molding a tube guide, material for the tube guide is poured into the tube guide molding mold and is hardened therein, whereby the step of manufacturing the tube guide and the step of mounting the tube guide onto the two end portions of the ball circulation tube is executed at the same time.

27. A method for manufacturing a ball screw as set forth in Claim 21, wherein, in a state where the two end portions of the ball circulation tube are inserted into a mold for molding a tube guide, material for the tube guide is poured into the tube guide molding mold and is hardened therein, whereby the step of manufacturing the tube guide and the step of mounting the tube guide onto the two end portions of the ball circulation tube is executed at the same time.